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Circular No. 22 (Revised edition).

United States Department of Agriculture,

DIVISION OF FORESTRY.

PRACTICAL ASSISTANCE TO TREE PLANTERS.

THE OFFER IN BRIEF.

The Division of Forestry is prepared, so far as its limited appropriation will permit, to render practical and personal assistance to farmers and others by cooperating with them to establish forest

Fig. 1.—Grove of Austrian Pine planted at Manhattan, Kans., about thirty-five years ago, and now showing typical forest conditions.

plantations, woodlots, shelterbelts, and windbreaks (fig. 1). A section of the Division was organized in 1899 and placed in charge of an expert tree planter, assisted by a number of field agents as well as by several collaborators residing in different States. This section devotes itself entirely to investigations in tree planting and to the assistance of those who may avail themselves of the cooperative plan

outlined in this circular. Applications for such assistance will be considered in the order of their receipt, but the Division reserves the right to give preference to those likely to furnish the most useful object lessons. After an application has been made and accepted, the Superintendent of Tree Planting, or a field agent, will visit the land of the applicant, and, after adequate study on the ground, will make a planting plan suited to its particular condition. The purpose of this plan is to give help in the selection of trees, information in regard to planting, and instruction in handling forest trees after they are planted.

The Division does not undertake to furnish trees or seeds to planters or participate in any manner or degree in the expenses of planting, except to defray the expenses of its agent in making the preliminary examination and the planting plan.

Briefly stated, the Division proposes to give such aid to tree planters that woodlots, shelterbelts, windbreaks, and all other economic plantations of forest trees may be so well established and cared for as to attain the greatest usefulness and most permanent value to their owners.

ORIGIN AND DEVELOPMENT OF THE PLAN.

The cooperative plan announced in Circular No. 21 of this Division, by which farmers, lumbermen, and others are assisted in handling forest lands, was so well received that the Division offered, in the first edition of the present circular, issued in July, 1899, a similar cooperative plan to aid farmers and other landowners in the treeless portions of the West, and in other regions where it is desirable to establish forest plantations. Under this offer about 200 applications for assistance have been received, and 125 planting plans have been put into operation. Applications are still being received and preliminary examinations and planting plans are being made as rapidly as the resources of the Division will permit.

Public recognition of the success of better methods applied to the establishment and management of forest plantations is rapidly increasing, and the application of such methods is being greatly extended. A higher standard is thus being reached. The object of the Division in cooperating with individual planters is both to increase planting and to promote a general acceptance of good methods in the handling of forest plantations.

TREE PLANTING IN THE PAST.

Forest-tree planting has been in progress in the West for many years. Although reasonable success has usually followed skillful planting and close attention to the selection of species and to their subsequent care, many of the tree claims of that region are failures.

This condition has largely arisen from the difficulty of obtaining accurate information at first hand regarding the most desirable species to grow in a given locality and from the lack of personal supervision by a competent tree planter in the setting out and subsequent care of the plantation.

Many of the earlier papers on forest-tree planting, scattered through the Western press and through the reports of Western horticultural societies, forestry associations, and boards of agriculture, were based upon untried theories or upon experience too brief to warrant the deductions made. Many species were recommended with the utmost confidence for planting in regions for which later experience has shown them to be entirely unfit. Although many valuable papers occur in the great mass of published material on Western tree planting, they are so obscured by unreliable matter as to be of little use to the inexperienced planter.

In the East a small amount of planting has been done, with much better results than has attended Western planting, but the good results are due to the more favorable natural conditions rather than to the methods employed; for methods of planting have received less consideration in the East than in the West. In both regions the method is so important that success to a great degree depends upon it.

The growing of forest trees can not be successfully undertaken without some knowledge of trees, their habits, and their adaptability to the place where they are to be planted. The grower must know what to plant, how to plant it, and how to care for it afterwards.

WHAT IT TEACHES.

A careful study of the forest plantations established in the past shows most forcibly the value of careful selection of species and of judgment in planting. Some are upon one kind of soil, some upon another; some are planted with trees close together, others with trees long distances apart; some have been pastured, others have not; some have been carefully cultivated, others have been allowed to grow to grass and weeds. As a result, some of these plantations are dead or dying, while others are in a thrifty condition. Accurate conclusions drawn from the work of the past, a knowledge of the causes of failures, and a correct accounting for the successful plantings should materially lessen future failures. The application of such knowledge must necessarily give a new impulse to tree planting.

THE VALUE OF FOREST PLANTATIONS TO FARMERS.

Few persons comprehend in full measure the direct and indirect value of forest plantations to farmers. In the humid portions of America, where nearly every farm has its woodlot, the total area of

the woodland is more than 200,000,000 acres. It is not possible to make an accurate statement of the value of the annual products from these lands, but when it is considered that nearly all the fuel used by the farmers of the region mentioned, together with most of the wood for fencing and a considerable portion of the timber for building purposes, are annually cut from the woodlots, their value begins to be appreciated.

For fuel and fencing, the woodlot and other forest plantings are equally desirable to dwellers on the plains. On Mr. E. T. Hartley's

FIG. 2.—A mixed plantation, twelve years old, of Birch, Black Cherry, Green Ash, and White Elm at the Experiment Station, Brookings, S. Dak.

farm, near Lincoln, Nebr., an acre of land set to willow has for several years provided all fuel used on the farm, and to-day there is more standing timber upon it than ever before. The planting is in a ravine of little value for general farming.

Forest plantations are valuable not only for the purposes above indicated, but in addition they have great indirect value (fig. 2). By conserving the moisture and tempering the wind, they modify the local climate to a very marked degree, while the value of well-established groves, woodlots, shelterbelts, and windbreaks, in the

protection which they afford crops, orchards, stock, and farm buildings, is of first importance.

Another very important indirect service of forest plantations, and one rarely taken into consideration, is the increased market value of a well-wooded farm over one without timber. Conservative estimates made on the grounds indicate that the farms of eastern and central Kansas and Nebraska that have well-developed plantations of forest trees upon them, in the form of woodlots, shelterbelts, or windbreaks, are worth considerably more per acre than farms without them.

As farmers come to recognize more fully the great direct as well

FIG. 3.—Interior view of plantation illustrated in fig. 2.

as indirect value of forest plantations, woodlots, shelterbelts, and windbreaks, scattered over the treeless agricultural regions, and undertake to grow them in greater numbers, even if individual plantations are small in extent, the total result will be of vast importance in the development of the West.

AN INCIDENTAL VALUE OF FOREST PLANTATIONS.

To the majority of people there is nothing else so attractive about a home as trees. A well-planted woodlot, in two or three years after its establishment, will provide the farmer with a supply of trees to plant along roads and for ornamental purposes about buildings and

gardens. As the trees in a plantation begin to crowd one another, many may be removed with material advantage to those that remain, care being taken not to interfere with the shading of the ground. The superfluous trees often pay the cost of cultivation and care for the plantation after it is once established.

SUCCESSFUL FOREST PLANTATIONS.

Tree culture in regions formerly treeless is dependent largely upon agriculture. Wherever large areas of land have been brought under cultivation the growing of trees is yearly becoming more successful. Nearly every State of the plains region has, among many failures, some admirable examples of plantations, of all ages from one to twenty-five or more years, which have been completely successful. The success of these plantations, when compared with the more numerous failures, proves the great need of practical experience, combined with wide and accurate knowledge, in growing forest trees in the West.

The forest plantation at the Agricultural College, Brookings, S. Dak., illustrates what may be accomplished in a few years on the open prairies of that State (fig. 3). The plantation at the Agricultural College at Manhattan, Kans., with its dense undergrowth, illustrates the possibility of the perpetuation of forests in that and similar localities after they are once well established. At Ogallah, longitude nearly 100 west, the State of Kansas has established a forest experiment station. The vigorous growth of many of the species at this station shows the value of thorough cultivation as a means of overcoming the effects of continued drought. Plantations on the neighboring tree claims are either dead or in poor condition, largely from lack of cultivation. On the farm of Judge C. E. Whiting, Monona County, Iowa, the timberbelts, planted about forty years ago, supply all the posts for keeping up 40 miles of fencing, the fuel for the homestead and tenants, and a large surplus as well. Only the overtopped trees are cut. Each species is planted pure, the trees growing in belts and in groves which protect the fields and the farm buildings. A varied undergrowth is coming in, which will maintain the forest after all the planted trees are cut down. The plantations established a few years ago by this Division in cooperation with the agricultural experiment stations in many of the Western States show interesting possibilities in mixed planting and in the selection of species.

COMMERCIAL PLANTATIONS.

A small number of plantations have been established and developed for profit. Most of these are located in the Middle West and consist principally of Hardy Catalpa, Locust, Black Walnut, Green

Ash, and Red Cedar, the purpose being the production of timber for use as posts and telegraph poles.

The majority of these plantations fall short of their maximum returns through lack of congenial soil or proper management, but a number of them show skill and wisdom in their conception and give promise of rich returns. A 10-year-old block in the Hardy Catalpa plantation of Mr. L. W. Yaggy, near Hutchinson, Kans., showed a net value of $197.55 per acre. The trees were grown for posts and telegraph poles and had reached an average height of 25 feet and an average diameter of 3¾ inches. Thinning became necessary when the plantation was 8 years old, the trees taken out being cut into fence posts. A 25-year-old plantation of Red Cedar belonging to Mr. F. C. F. Shultz, near Menlo, Iowa, showed trees averaging 15 feet high, 5⅓ inches in diameter, and had a net value of slightly more than $200 per acre. A number of other plantations can be pointed out that give returns exceeding those to be obtained from agricultural crops on the same land. Such returns are leading many persons to establish forest plantations purely as a matter of investment.

COST OF PLANTING AND CULTIVATING FOREST TREES.

The cost of planting and subsequent care of a forest plantation varies greatly. Much depends upon the kinds of trees planted, the cost of labor, and the character of the soil. In most places trees can now be bought very cheaply. Deciduous trees of one season's growth, which under most conditions is the best age for general planting, can be purchased in quantity at prices varying from 75 cents to $5 per thousand. But even at this price, in the case of the hardier trees, such as Green Ash, Silver Maple, White Elm, Boxelder, Hackberry, Black Walnut, Burr Oak, and Locust, it is much more convenient and usually cheaper for the farmer to grow his own seedlings.

Conifers are more difficult to grow from the seed, and most farmers will find it better to buy trees of this class from nurserymen. If, however, conifers are purchased directly from the seed bed, the more common species will cost from $2.50 to $5 per thousand. Such plants must be grown for two or three years in beds or nursery rows before transferring to the plantation.

The stock for a plantation of desirable species, 1 year old, set 4 feet apart each way, may be purchased at the cost of from $4 to $10 per acre. For older stock and for species difficult to grow from seed, or rare in nurseries, the cost will be much greater.

After the first year the cost will depend very greatly upon the success of the first planting. Thorough cultivation will be required until the trees are sufficiently large to shade out grass and weeds. In treeless regions the same care that a successful farmer gives his

cornfield should be given the forest plantation for the first two or three years. Not only should weeds and grass be kept down, but the surface soil should be frequently stirred during spring and summer to prevent excessive soil evaporation and consequent injury to the trees.

WHEN AND HOW LONG PLANTATIONS PAY.

The immediate value of a forest plantation will depend largely upon the rapidity of growth of the trees planted and the value of their products. Under favorable circumstances, after the plantation has reached the age of from eight to twelve years, some trees suitable for fuel and posts can be taken out yearly without injury to the rest. If the plantation be correctly managed, young trees will often come up of their own accord to take the place of the older trees as they are removed. This is true already in many of the better managed among the older plantations in the West. Under a broad shelter belt of Silver Maple, White Elm, Black Walnut, and Green Ash, planted some thirty-five years ago at Manhattan, Kans., there is now a thick undergrowth which contains a large percentage of the trees and shrubs indigenous to eastern Kansas. The undergrowth is entirely the result of natural agencies. Seeds from trees and shrubs on the river bottoms have been brought in by the wind and by birds and other forms of animal life. Undergrowth of this kind, which varies in this plantation from a few inches to 15 feet in height, will, if properly managed, provide ample material to take the place of the older trees as they are gradually cut down. In this plantation, as in others handled in like manner, there is no reason why there should not be a continual succession of trees, generation after generation, without the expenditure of a single dollar for replanting. But if sheep or other stock are allowed to graze in or overrun a plantation, undergrowth is prevented from coming in, and no provision is made for the perpetuation of the forest condition. The soil becomes packed by the trampling of the stock, the natural mulch is destroyed, and the trees suffer.

After a plantation has begun to provide fuel, posts, and other material for farm uses it should continue to supply such products indefinitely. To secure this result, however, only a limited amount may be taken out in any single season.

PLANTING IN THE EAST.

Forest planting in the East should be practically confined to the land that by nature of its roughness or sterility is unfit for agricultural purposes. Mountain sides and stony land are usually fit only for the production of timber, and should be kept constantly forested. So long as lumber was plentiful and cheap no progress could be made

in such planting, but now that it is becoming profitable to grow timber, this otherwise worthless land has begun to receive attention. Mr. N. T. Arnold, of Ridgway, Pa., has already planted extensively on land of this character, in cooperation with the Division of Forestry, and is rapidly covering his farm, which consists of stony mountain slopes, with valuable young forests (fig. 4).

Many of the worn-out farms of the East may be restored to fertility by growing forest trees upon them for a series of years, and many of them are better suited for the production of timber than

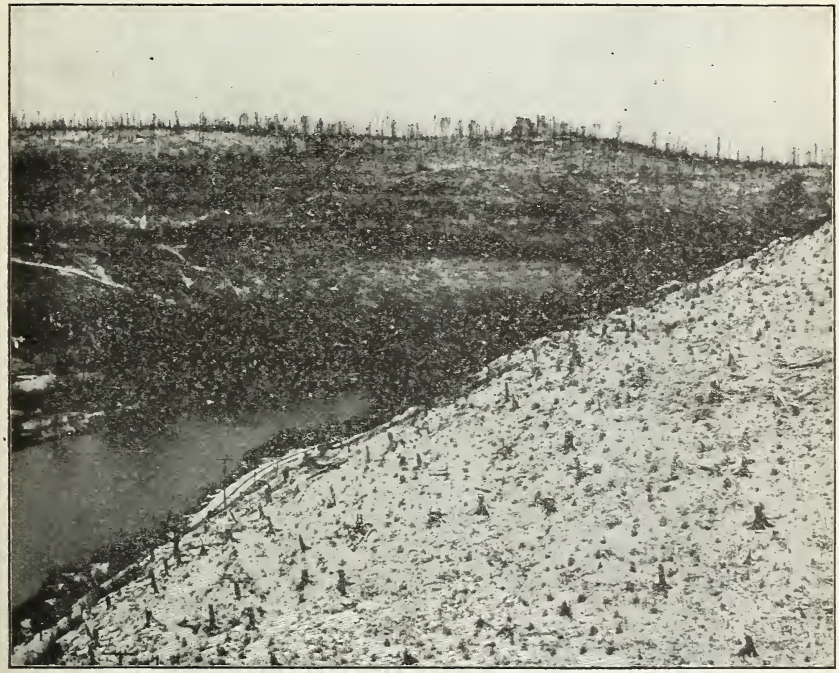

FIG. 4.—Scotch and White Pine planted on steep hillside near Ridgway, Pa. The young trees, which have been planted but one year, are to be seen among the stumps.

for any other purpose. It is fortunately true that worn-out farm lands throughout the region once wooded will usually revert to their previous condition if protected from fire and stock. The process is naturally slow, and the result may be materially hastened, and more valuable forest may be grown, by the judicious planting of useful species.

PLANTING IN THE WEST.

The range for forest planting now extends almost throughout the Middle West, though the need of plantations is greater in some localities than in others. Wood lots, shelter belts, and wind breaks

are needed in this region to provide fuel, posts, and poles, as well as to protect and shelter buildings animals, and field crops. In some localities extensive plantations should be established to supply fence posts, telegraph poles, and railroad ties.

In nearly the whole of the broad prairie belt extending to longitude 100 west, and reaching from North Dakota to Texas, trees may be grown with some degree of success. On the western border of the naturally wooded area nearly all the species may be grown which are indigenous to the adjacent woodlands. Farther west the range

FIG.—Rows of Cottonwood on the side of irrigating ditch near Roswell, N. Mex.

in selection becomes more and more restricted, until the western limit of successful tree culture on non irrigated lands is reached.

PLANTING IN IRRIGATED REGIONS.

As a rule, but little difficulty is experienced in growing trees in irrigated regions. Proper judgment in the selection of species is, however, of great importance. From the standpoint of money return, forest plantations and wood lots will not pay on some irrigated lands on account of the high value of such land for other purposes. Many

irrigated farms, however, have waste places along ditches and elsewhere where forest trees can be grown successfully for economic purposes, and windbreaks are always useful and often among the prime necessities for irrigation and farming. Rows of trees along irrigating ditches, and shelterbelts around reservoirs, are of great value in retarding evaporation and in keeping the water cool. Shelterbelts may sometimes be planted on grade lines along rocky ridges or stony elevations with little expense for irrigation and with material advantage to the farm (fig. 5).

In many irrigated regions some trees will thrive fairly well without irrigation after the first or second season's growth.

THE PLAN OF COOPERATION.

Applications for assistance under the terms of this circular will be considered, as already stated, in the order in which they are received, but precedence will be given to the lands most likely to furnish useful examples, after the study on the ground has been made. The plan formulated for establishing and developing the forest plantation, woodlot, shelterbelt, or windbreak will not be put into effect unless it be satisfactory both to the Division of Forestry and to the owner. The specific agreement which the Department of Agriculture is prepared to make is as follows:

TREE PLANTING AGREEMENT.

WASHINGTON, D. C., ————, *190—*.

The Department of Agriculture of the United States and ——— ———, of ———, county of ———, State of ———, mutually agree as follows:

(1) The Department of Agriculture, in pursuance of investigations in forestry and in order to disseminate a knowledge of improved ways of planting and developing forest plantations, woodlots, shelterbelts, and windbreaks, shall, after personal study on the ground by its agents, prepare a plan for planting and caring for a forest plantation, woodlot, shelterbelt, or windbreak, on —— acres of land of the said ——— ———, situated and described as follows: —— —— —— —— town of ———, county of ———, State of ———.

(2) The said plan shall be prepared for the purpose of promoting and increasing the present value and usefulness of said land to its owner and to develop and perpetuate a plantation of forest trees upon it.

(3) Upon the completion of the said plan and its acceptance by the said ——— ———, the Department of Agriculture shall supervise the execution thereof so far as may be necessary.

(4) The Department of Agriculture shall not furnish seeds nor trees nor participate in any degree in the expenses of planting and caring for said forest plantation, woodlot, shelterbelt, or windbreak, nor share in any profit which may arise from its growth.

(5) The Department of Agriculture shall render all services under this agreement wholly without charge to the said ——— ———, but if the plantation described in paragraph 1 be of such a nature as to require inspections subsequent to the preliminary examination, and such inspections be made upon the special

request of the owner, said owner shall pay the actual and necessary expenses for traveling and subsistence of the agents of the Department working under this agreement. What are "actual and necessary expenses" shall be determined by the printed regulations of the Department.

(6) The Department of Agriculture shall have the right to publish and distribute the said plan and its results for the information of farmers and others whom it may concern.

(7) This agreement may be dissolved by either party upon ten days' notice given to the other.

(Signed) ——— ———,
Owner.

(Signed) ——— ———,
Secretary of Agriculture.

Post-office: ——— Date: ———

The planting plan above mentioned being completed, is now accepted, and will be carried out under the conditions and during the validity of the above agreement.

(Signed) ——— ———,
Owner.

HINTS TO APPLICANTS.

Persons desiring the assistance of the Division of Forestry under the provisions of this circular should make application by letter, specifying the State, county, township, range, and section on which the planting is contemplated and giving the acreage to be planted and the time they desire to begin planting. Applications received during the fall and winter are not likely to receive attention before the following season, on account of the impracticability of field work in winter.

GIFFORD PINCHOT,
Forester.

Approved:
JAMES WILSON,
Secretary of Agriculture.

WASHINGTON, D. C., *February 15, 1901.*

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